

Form 1449 (Modified)

**Information Disclosure  
Statement By Applicant**

(Use Several Sheets if Necessary)

Atty Docket No. CISC601C2  
Application No.: 09/435,293  
Inventor Gregory G. Raleigh  
Group *2634* 2634  
Filing Date November 5, 1999

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**U.S. Patent Documents**

Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-Class	Filing Date
<i>CF</i>	A	6,097,771	8/1/2000	Foschini	375	346	7/1/96
	B						
	C						
	D						
	E						

**Foreign Patent or Published Foreign Patent Application**

Examiner Initial	No.	Document No.	Publication Date	Country or Patent Office	Class	Sub-class	Translation	
							Yes	No
<i>CF</i>	F	2716055	8/11/1995	FR	—	—		
<i>CF</i>	G	0715477	6/5/1996	EP	—	—		
	H							
	I							
	J							

**Other Documents**

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
<i>CF</i>	K	Seshadri N. et al., "Space-Time Codes for Wireless Communication: Code Construction" IEEE Vehicular Technology Conference, US NY IEEE Vol. Conf. 47 4 May 1997 pages 637-641
	L	
	M	
	N	
Examiner <i>Chul Min Jhan</i>		Date Considered <i>9/17/01</i>

Examiner: Initial citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



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Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-class	Filing Date
<i>CF</i>	AA	4,337,376	06/1982	Gruenberg	179	2 EB	12/1979
<i>CF</i>	AB	4,710,944	12/1987	Nossen	375	40	10/1986
<i>CF</i>	AC	5,134,715	07/1992	Parl et al.	455	64	11/1989
<i>CF</i>	AD	5,228,025	07/1993	Le Floch et al.	370	20	01/1991
<i>CF</i>	AE	5,315,584	05/1994	Savary et al.	370	18	12/1991
<i>CF</i>	AF	5,345,599	09/1994	Paulraj et al.	455	49.1	02/1992
<i>CF</i>	AG	5,471,647	11/1995	Gerlach et al.	455	63	04/1993
<i>CF</i>	AH	5,479,444	12/1995	Malkamaki et al.	375	231	02/1994
<i>CF</i>	AI	5,510,779	04/1996	Wishart	342	373	06/1993
<i>CF</i>	AJ	5,515,378	05/1996	Roy, III et al.	370	95.1	12/1991
<i>CF</i>	AK	5,548,819	08/1996	Robb	455	59	08/1995
<i>CF</i>	AL	5,566,209	10/1996	Forssen et al.	375	262	02/1994
<i>CF</i>	AM	5,592,490	01/1997	Barrett et al.	370	310	01/1995

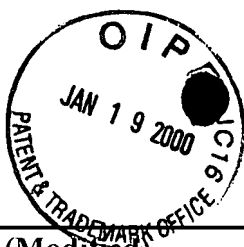
### Foreign Patent or Published Foreign Patent Application

Examiner Initial	No.	Document No.	Publication Date	Country or Patent Office	Class	Sub-class	Translation	
							Yes	No
<i>CF</i>	AN	WO 95/22873	08/1995	PCT	1	1	TECH. CENTER 2700 JAN 20 2000	RECEIVED
<i>CF</i>	AO	WO 96/30964	10/1996	PCT	1	1		
<i>CF</i>	AP	WO 98/09381	03/1998	PCT	1	1		

### Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
<i>CF</i>	AQ	Hirono et al., "Digital terrestrial television broadcasting with OFDM - A study on the performance of single frequency networks" 1996, Int'l Broadcasting Convention, p. 178-183.
Examiner <i>Chieh Min Tsai</i>		Date Considered <i>9/17/01</i>

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### U.S. Patent Documents

Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-class	Filing Date
<i>CF</i>	BA	5,634,199	05/1997	Gerlach et al.	455	63	04/1995
<i>CF</i>	BB	5,642,353	06/1997	Roy, III et al.	370	329	06/1995
<i>CF</i>	BC	5,649,287	07/1997	Forssen et al.	370	312	03/1995
<i>CF</i>	BD	5,691,727	11/1997	Cyzs	342	361	12/1995
<i>CF</i>	BE	5,752,173	05/1998	Tsujimoto	455	137	06/1995
<i>CF</i>	BF	5,809,019	09/1998	Ichihara et al.	370	334	04/1996
<i>CF</i>	BG	5,886,988	03/1999	Yun et al.	370	329	12/1996
<i>CF</i>	BH	5,966,094	10/1999	Ward et al.	342	373	10/1997

### Foreign Patent or Published Foreign Patent Application

Examiner Initial	No.	Document No.	Publication Date	Country or Patent Office	Class	Sub-class	Translation	
							Yes	No
<i>CF</i>	BI	WO 98/09395	03/1998	PCT	-	-		
<i>CF</i>	BJ	0253465	03/1987	EPO	-	-		

### Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
<i>CF</i>	BK	P.A. Voois, "Two-dimensional signal processing for magnetic storage systems", 1993, Ph.D. Thesis, Stanford University, pp. 1-136.
<i>CF</i>	BL	Biglieri et al., "Introduction to trellis coded modulation with applications", 1991, MacMillan Publishing.
<i>CF</i>	BM	P. Lancaster, "Theory of matrices", 1969, Academic Press, Chap. 2.
<i>CF</i>	BN	Raleigh et al., "Spatio-temporal coding for wireless communications", 1996, IEEE Transactions on Communications.
Examiner <i>Chieh Mei Fan</i>		Date Considered <i>9/17/01</i>

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	CA						

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Examiner Initial	No.	Document No.	Publication Date	Country or Patent Office	Class	Sub-class	Translation	
							Yes	No
<i>cf</i>	CB	WO 98/09395	03/1998	PCT	-	-		

### Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
<i>cf</i>	CC	Justin C.I. Chuang, "Burst coherent demodulation with combined symbol timing, frequency offset estimation and diversity selection", 1991, IEEE, Vol. 39, no. 7, pp. 1157-1164.
<i>cf</i>	CD	Leonard J. Cimini, Jr., "Analysis and simulation of a digital mobile channel using orthogonal frequency division multiplexing", 1985, IEEE, Vol. 33, No. 7, pp. 665-675.
<i>cf</i>	CE	Kouichi Ohkawa, "Performance of multicarrier trellis-coded 8PSK using frequency hopping in rayleigh fading channels", 1994, Not. Conference Publication - Institution of Engineers, Vol. 1, pp. 145-149.
<i>cf</i>	CF	Essam A. Sourour, "Performance of orthogonal multicarrier CDMA in a multipath fading channel", 1996, IEEE, Vol. 44, No. 3, pp. 356-367.
<i>cf</i>	CG	Hirofumi Ichikawa, "Frequency diversity effects in multicarrier digital radio systems", 1991, Electronics and Communications in Japan, Part. 1, Vol. 74, No. 8, pp. 70-77.
Examiner <i>Chieh Min Fan</i>		Date Considered <i>9/17/01</i>

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**U.S. Patent Documents**

Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-class	Filing Date
	DA						

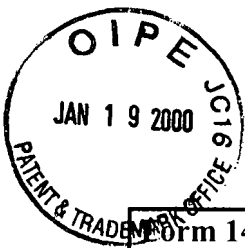
**Foreign Patent or Published Foreign Patent Application**

Examiner Initial	No.	Document No.	Publication Date	Country or Patent Office	Class	Sub-class	Translation	
							Yes	No
	DB							

**Other Documents**

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
<i>cf</i>	DC	J. L. Holsinger, "Digital communications over fixed time-continuous channels with memory, with special application to telephone channels", 1964, MIT Research Laboratory Electronics Report, Vol. 430.
<i>cf</i>	DD	Cover et al., "Elements of information theory", 1991, New York: John Wiley, Chp. 2, pps. 12-49, Chp. 8 pps. 183-223, and Chap. 10 pps. 239-265
<i>cf</i>	DE	R.J. Muirhead, "Aspects of multivariate statistical theory", 1982, New York: John Wiley, Chps. 4 and 5.
<i>cf</i>	DF	W.C. Jakes, "Microwave mobile communications", 1974, New York: John Wiley, Chps. 1, 5, and 6.
<i>cf</i>	DG	Braun et al., "A physical mobile radio channel model", 1991, IEEE Vehicular Technolpgy, Vol. 40, pps. 472-482.
<i>cf</i>	DH	Bryson et al., "Applied optimal control", 1968, Washington D.C. Hemisphere Publishing, pps. 24-29.
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	EA						

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							Yes	No
	EB							

**Other Documents**

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
<i>CF</i>	EC	Cioffi et al., "Vector coding for partial-response channels", 1990, IEEE Transactions on Information Theory, Vol. 36, pp. 741-762.
<i>CF</i>	ED	Mikael Gudmundson, "Spectral efficiency of a multitone frequency hopping system for personal communication systems", 1994, IEEE Vehicular Technology Conferences, prt. 3, Vol. 3, p. 1650-1654.
<i>CF</i>	EE	T. Aron Gulliver, "Order statistics diversity combining in worst case noise and multitone jamming", 1995, IEEE Vehicular Technology Conference, Vol. 2, pp. 804-809.
<i>CF</i>	EF	R. Monnier, "Digital television broadcasting with high spectral efficiency", 1992, IEEE Conference Pub. No. 358, pps. 380-384.
<i>CF</i>	EG	Enrico Del Re, "Digital Multicarrier demodulator for regenerative communication satellites", 1988, Alta Frequenza, Vol. 57, No. 10, pps. 545-559.
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<i>Chieh Min Fan</i>	<i>9/17/01</i>	

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	Inventor	GREGORY G. RALEIGH
	Group <i>2634</i>	Unassigned
	Filing Date	November 5, 1999

### U.S. Patent Documents

Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-class	Filing Date
	FA						

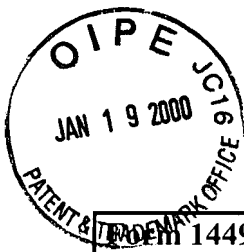
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Examiner Initial	No.	Document No.	Publication Date	Country or Patent Office	Class	Sub-class	Translation	
							Yes	No
	FB							

### Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
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<i>cf</i>	FD	Fulvio Ananasso, "Clock synchronous multicarrier demodulator for multi-frequency TDMA communications satellites", 1990, IEEE International Conference on Communications, Col. 3, pps. 1059-1063.
<i>cf</i>	FE	M. Friese, "Multicarrier modulation with low peak-to-average power ratio", 1996, Electronics Letters, Vol. 32, No. 8, pps. 713-714.
<i>cf</i>	FF	Adil Benyassine, "Optimal subchannel structuring and basis selection for discrete multicarrier modulation", 1995, IEEE Communications Theory Mini-Conference Proceedings, CTMC, pps. 97-101.
<i>cf</i>	FG	M. Sawahashi, "Multicarrier 16QAM transmission with diversity reception", 1996, Electronics Letters, Vol. 32, No. 6, pps. 522-523.
Examiner	<i>Chiel Min Fan</i> Date Considered <i>9/17/01</i>	

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	Inventor	GREGORY G. RALEIGH
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#### Foreign Patent or Published Foreign Patent Application

Examiner Initial	No.	Document No.	Publication Date	Country or Patent Office	Class	Sub-class	Translation	
							Yes	No
	GB							

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Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
<i>CF</i>	GC	Flavio Daffara, "A new frequency detector for orthogonal multicarrier transmission techniques", IEEE 45 <sup>th</sup> Vehicular Technology Conference, pps. 804-809.
<i>CF</i>	GD	C.E. Shannon, "Mathematical theory of communications: Part I and Part II", 1948, The Bell System Journal, pps. 379-423, 623-656.
<i>CF</i>	GE	Fectel et al., "Optional feedforward estimation of frequency-selective fading radio channels using statistical channel information", 1992, in Proc. SUPERCOMM/ICC '92, Vol. 2.
<i>CF</i>	GF	Brandenburg et al., "Capacity of the gaussian channel with memory: the multivariate case", 1993, Bell System Technical Journal, Vol. 53, pps. 745-78.
<i>CF</i>	GG	Cheng et al., "Gaussian multiaccess channels with ISI: Capacity region and multiuser water-filling", 1993, IEEE Trans. Inform. Theory, Vol. 39(3), pps. 773-785.
<i>CF</i>	GH	J. Salz, "Digital transmission over cross-coupled linear channels", 1985, AT&T Tech. Journal, Vol. 64(6), pps. 1147-1159,
Examiner <i>Chieh Min Fan</i>	Date Considered <i>9/17/01</i>	

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	HA						

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							Yes	No
	HB							

### Other Documents

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
<i>cf</i>	HC	A. Duel-Hallen, "Equalizers for multiple input multiple output channels and PAM systems with cyclostationary input sequences", 1992, IEEE Journal on Sel. Areas in Comm., Vol. 10(3), pps. 630-639.
<i>cf</i>	HD	Yang et al., "On joint transmitter and receiver optimization for multiple-input multiple-output (MIMO) transmission systems", 1994, IEEE Trans. Commun., Col. 42-(12), pps. 3221-3231.
<i>cf</i>	HE	Yang et al., "Joint transmitter-receiver optimization for multi-input multi-output systems with decision feedback", 1994, IEEE Trans. Information Theory, Vol. 40(5), pps. 1334-1347.
<i>cf</i>	HF	Cox et al., "Distributions of multipath delay spread and average excess delay for 910 Mhz urban mobile radio paths", 1975, IEEE Trans. Antennas and Prop., Vol. Ap-23, pps. 206-213.
<i>cf</i>	HG	Weinstein et al., "Data transmission by frequency-division multiplexing using the discrete fourier transform", 1971, IEEE transactions on communications, vol. 19(5), pps. 628-634.
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							Yes	No
	IB							

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Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
<i>cf</i>	IC	Ruiz et al., "Discrete multiple tone modulation with coset coding for the spectrally shaped channel", 1992, IEEE Trans. Commun, Vol. 40(6), pps. 1012-1029.
<i>cf</i>	ID	R.M. Gray, "On the asymptotic eigenvalue distribution of toeplitz matrices", 1972, IEEE Trans. Information Theory, Vol. 18, pps. 725-730.
<i>cf</i>	IE	G. Forney, "Maximum-likelihood sequence estimation of digital sequences in the presence of intersymbol interference", 1972, IEEE Trans. Inform. Theory, Vol. IT-18(3), pps. 363-378,
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